
Methodology for Flow and Salinity Estimates in the Sacramento-San Joaquin Delta and Suisun Marsh

**23rd Annual Progress Report
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Chapter 7: Generating Monthly Dissolved Organic Carbon and UVA at DSM2 Boundaries

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7 Generating Monthly Dissolved Organic Carbon and UVA at DSM2 Boundaries

7.1 Introduction

Dissolved organic carbon (DOC) and ultraviolet light absorbance (UVA) have been developed for the Sacramento River at Greens Landing, the San Joaquin River at Vernalis, and the Mokelumne River at I-5 for the 1975–1991 planning simulation period. This chapter presents these data and details the methodology used.

7.2 General Methodology

DOC for the planning period was developed using two different methods. In the first method, due to a small variation in historical data, constant monthly DOC values were used for June through October. These values were calculated using data from 1987 through 1998. The second method was applied to the remaining months (November–May). These months have a greater variation in data over the historical period so in this method, relationships between DOC and flow were developed. These relationships are discussed in detail in the following paragraphs.

The averaged observed DOC from June through October (approximately from 1987 through 1998) was assigned as monthly DOC for the same months over the planning period. In order to generate DOC for the remaining months, relationships between observed DOC and flow were established and then applied to the historic flows over the planning period.

Relationships between DOC and flow were found by first partitioning observed DOC into three or four categories according to the ratio of observed DOC to historic flow. The categories were presented as containing data exhibiting “low”, “moderate”, or “high” DOC response to flow. Regressions were then found between DOC and flow for each category of data. Historic patterns of DOC / flow values were then examined to determine the conditions under which low, moderate, or high DOC response to flow occurred in the past. General trends in the historic data were used to assign each month in the planning period with low, moderate, or high DOC / flow values. Each month then was assigned a constant DOC (for June through October) or a regression was applied to the flow to obtain DOC. Finally, any generated DOC was limited to falling within minimum and maximum observed DOC at that location.

UVA over the planning period was generated at the three sites by applying regressions between historic UVA and DOC to the generated DOC.

Historic DOC and UVA was available from once or twice-per-month grab samples collected over the approximate period of 1987 through 1998 by the Department’s Municipal Water Quality Investigations (MWQI). DOC and UVA in the American River were used as a surrogate for the Mokelumne River. Multiple values of DOC or UVA in any given month were averaged together

to yield one value per month. Monthly average flows in the Sacramento, San Joaquin, and American rivers were determined using DAYFLOW.

7.3 Sacramento River at Greens Landing

7.3.1 Dissolved Organic Carbon at Greens Landing

Figure 7.1 shows historic DOC and flow in the Sacramento River at Greens Landing. DOC from June through October was averaged to yield a single value of 1.81 mg/L to approximate monthly DOC from June through October for the planning period (Figure 7.2). DOC in other months exhibited a pattern of high values associated with the first large flows of the fall/winter and low values after sustained high flows. Figure 7.3 and Table 7.1 show that, after excluding the June-October data, partitioning DOC according to DOC / flow ratio, yielded reasonable regressions between DOC and flow.

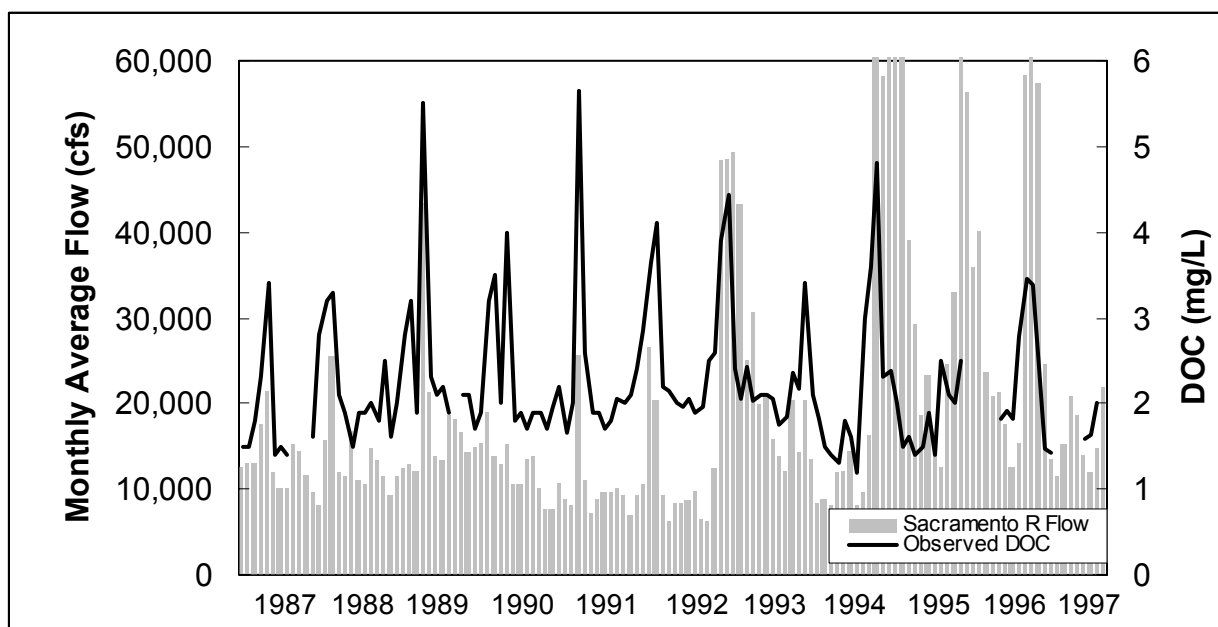


Figure 7.1: Observed DOC and Flow at Greens Landing.

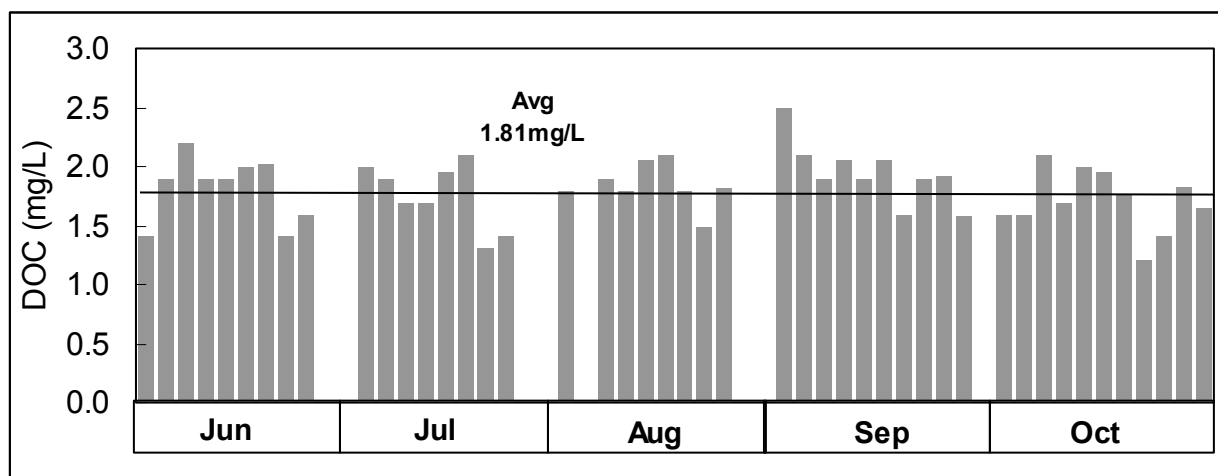


Figure 7.2: Observed DOC at Greens Landing, 1987–1997 (Grouped by Month).

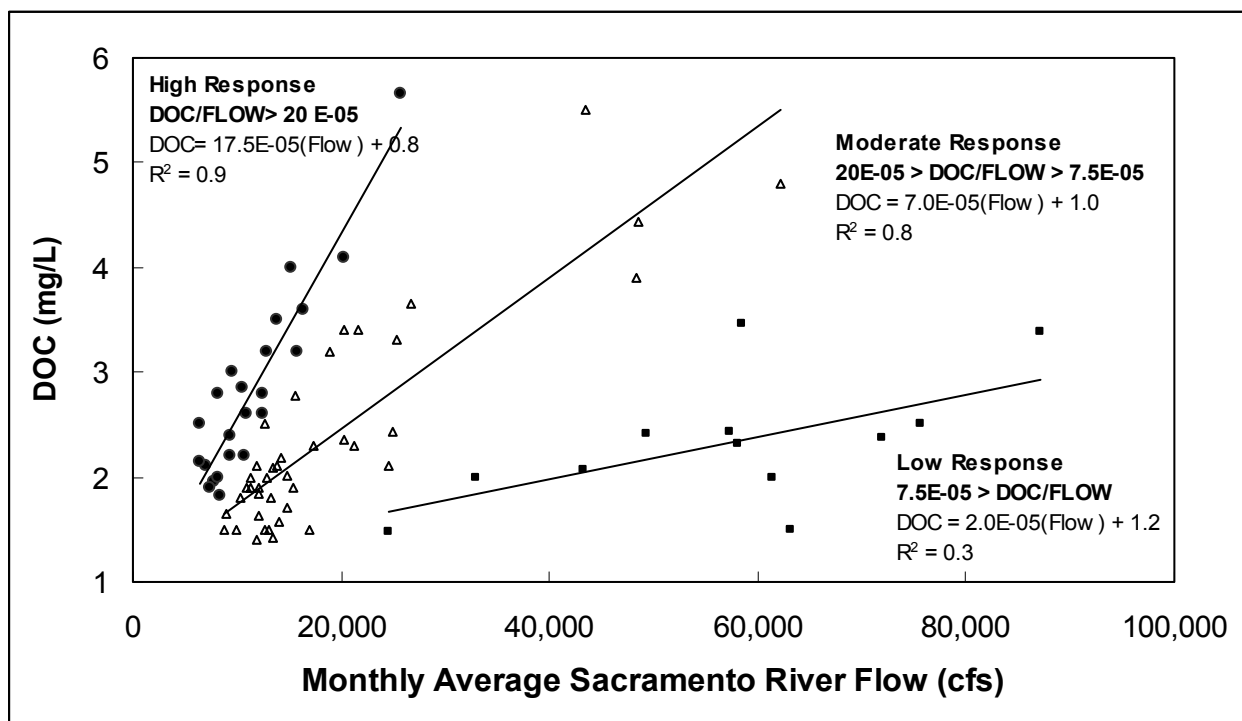


Figure 7.3: Observed DOC and Flow at Greens Landing Grouped by Response to Flow (Jun.–Oct. Data Removed).

Table 7.1: Classification of DOC Response to Flow at Greens Landing.

DOC Response to Flow	Criteria	Regression Equation	R ²
Low	$7.5\text{E-}05 > \text{DOC} / \text{FLOW}$	$\text{DOC} = 2.0\text{E-}05(\text{FLOW}) + 1.8$	0.3
Moderate	$20\text{E-}05 > \text{DOC} / \text{FLOW} > 7.5\text{E-}05$	$\text{DOC} = 7.0\text{E-}05(\text{FLOW}) + 1.0$	0.8
High	$\text{DOC} / \text{FLOW} > 20\text{E-}05$	$\text{DOC} = 17.5\text{E-}05(\text{FLOW}) + 0.8$	0.9

DOC: monthly dissolved organic carbon (mg/L)
FLOW: monthly average flow in Sacramento River at Sacramento (cfs)

Historic flows at Greens Landing were then described as being associated with “low”, “moderate”, or “high” DOC response (Figure 7.4). Observed patterns of DOC response to flow were applied to the planning period by considering current and preceding flows. This allowed each monthly flow during the planning period to be associated with either 1.81 mg/L DOC (June–October), or with one of three regressions with DOC (Figure 7.5).



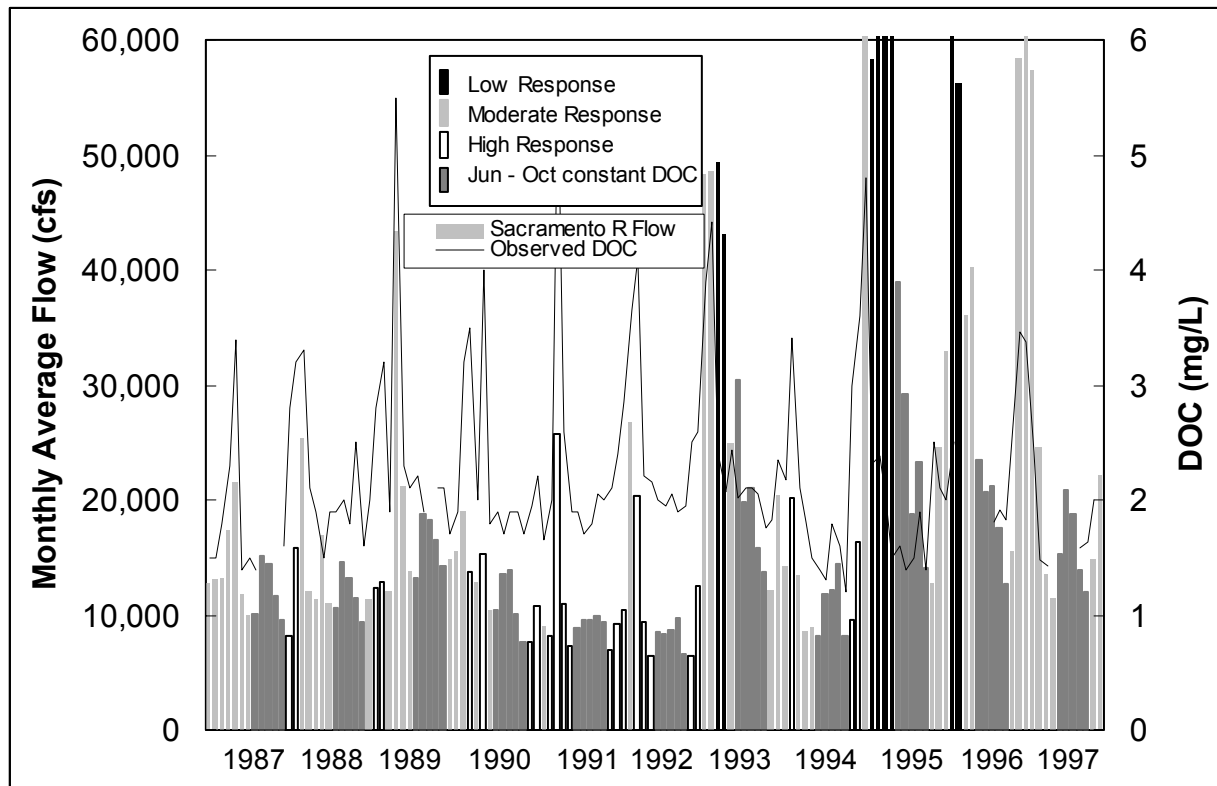


Figure 7.4: Observed DOC and Response to Flow at Greens Landing.

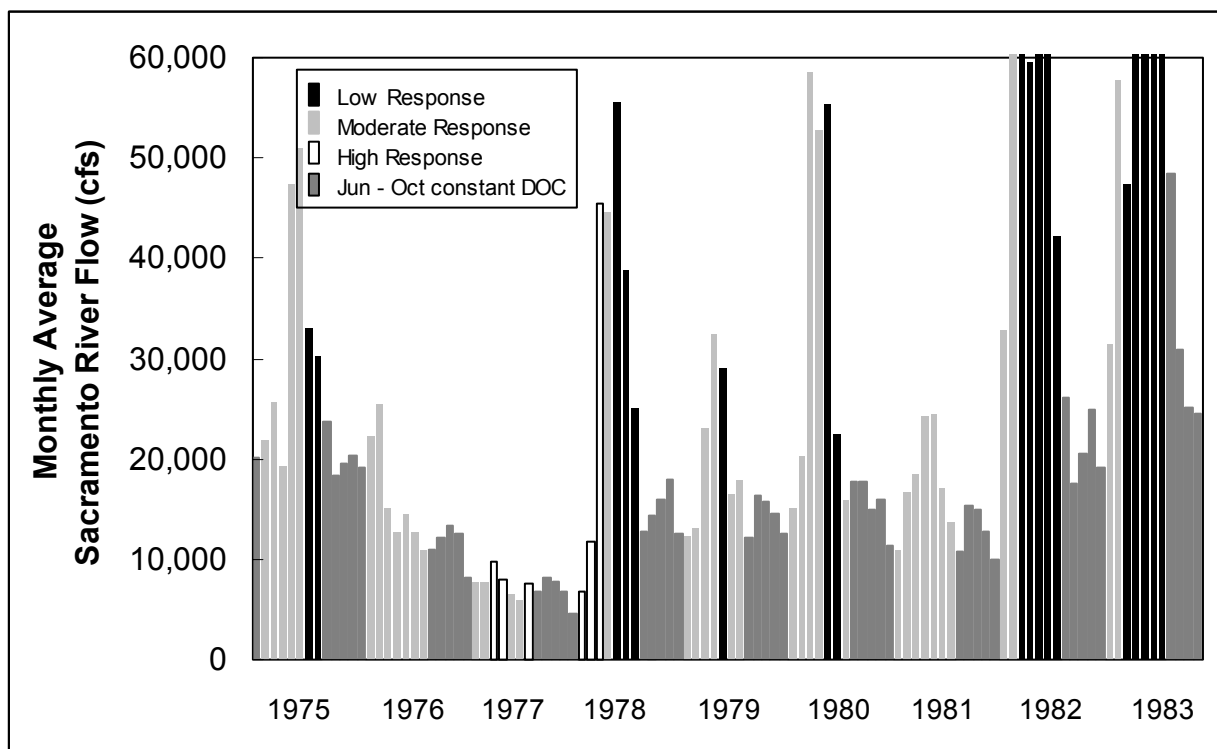


Figure 7.5a: Assignment of DOC/Flow Relationship at Greens Landing for Planning Period: 1975–1983.

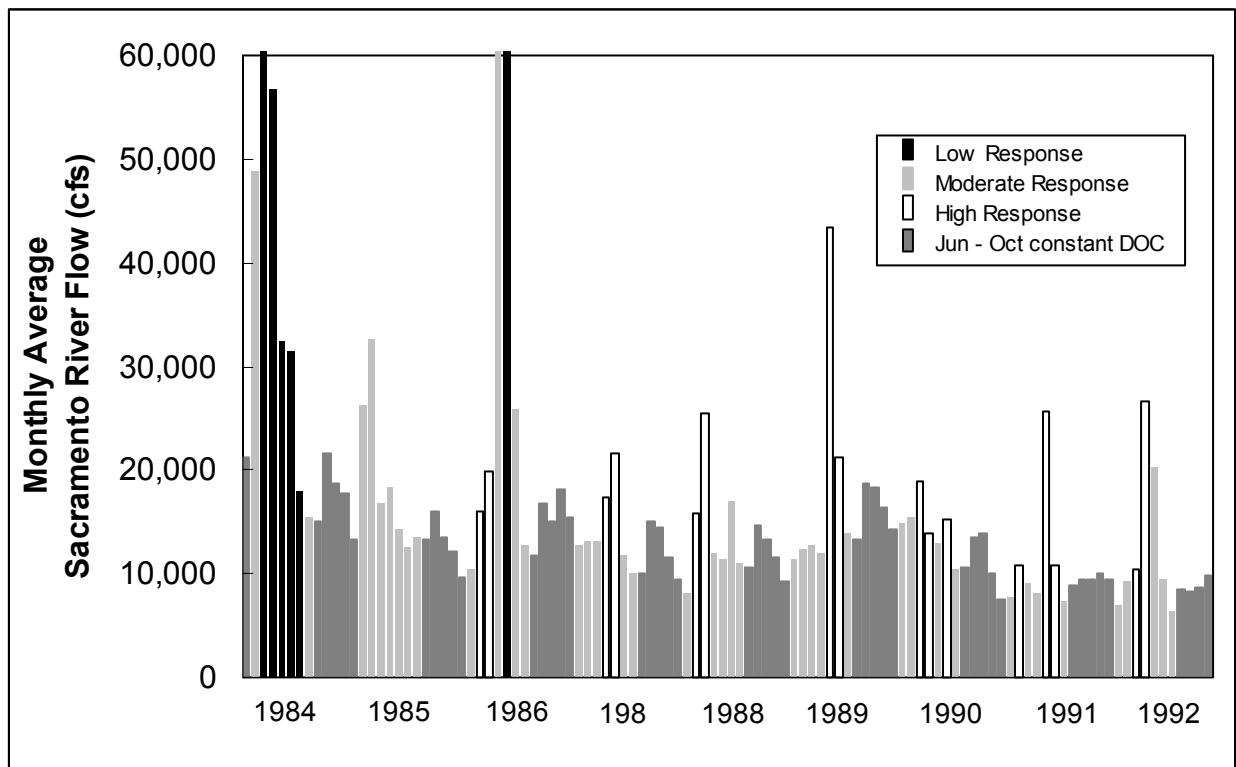


Figure 7.5b: Assignment of DOC/Flow Relationship at Greens Landing for Planning Period: 1984–1992.

After assigning a DOC of 1.81 mg/L to each month from June through October, appropriate regressions were applied to average flows from other months to generate monthly DOC. DOC derived from the regressions was limited to between 1.5 and 5.5 mg/L, the minimum and maximum values seen in the observed data. Figure 7.6 compares the historic DOC to the DOC generated by this method. Figure 7.7 and Table 7.2 show the resulting DOC over the planning period. Peak DOC occurred periodically when flow first increased in the fall or winter after several months of relatively low flow. The average DOC generated at Greens Landing by this process over the planning period was similar to the average observed DOC (Figure 7.8).

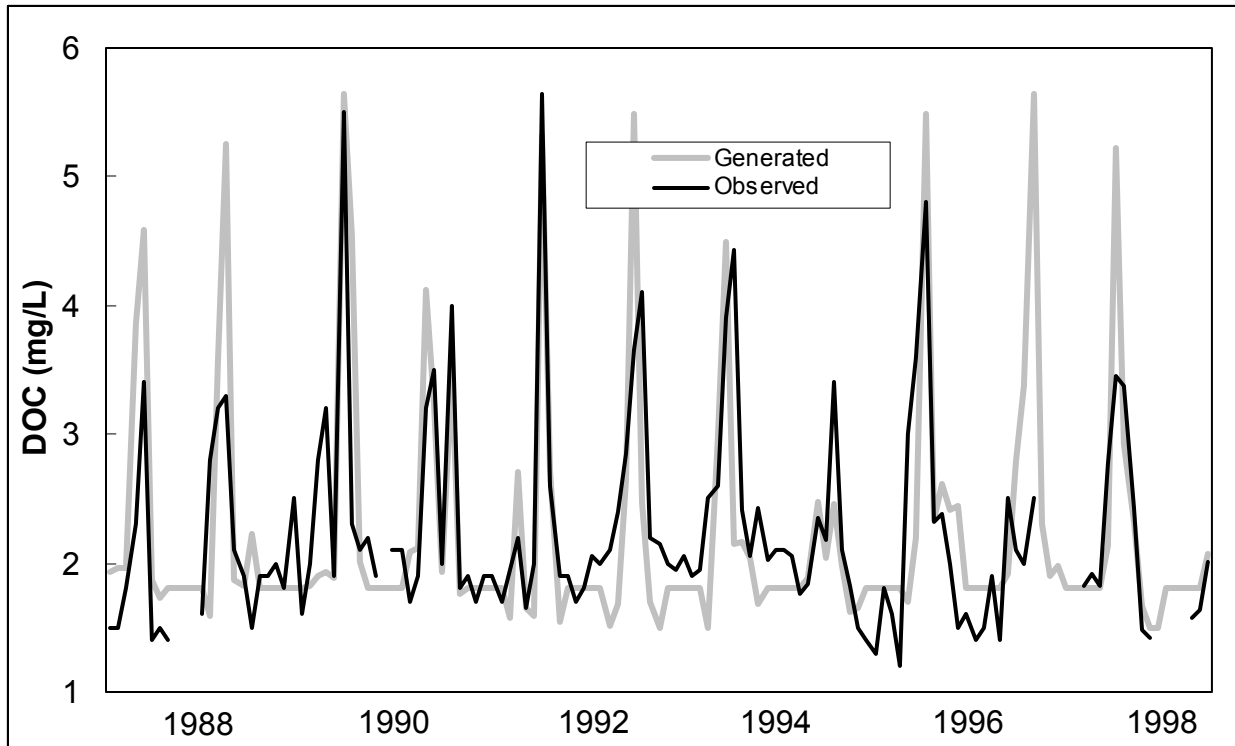


Figure 7.6: Observed and Generated DOC at Greens Landing.

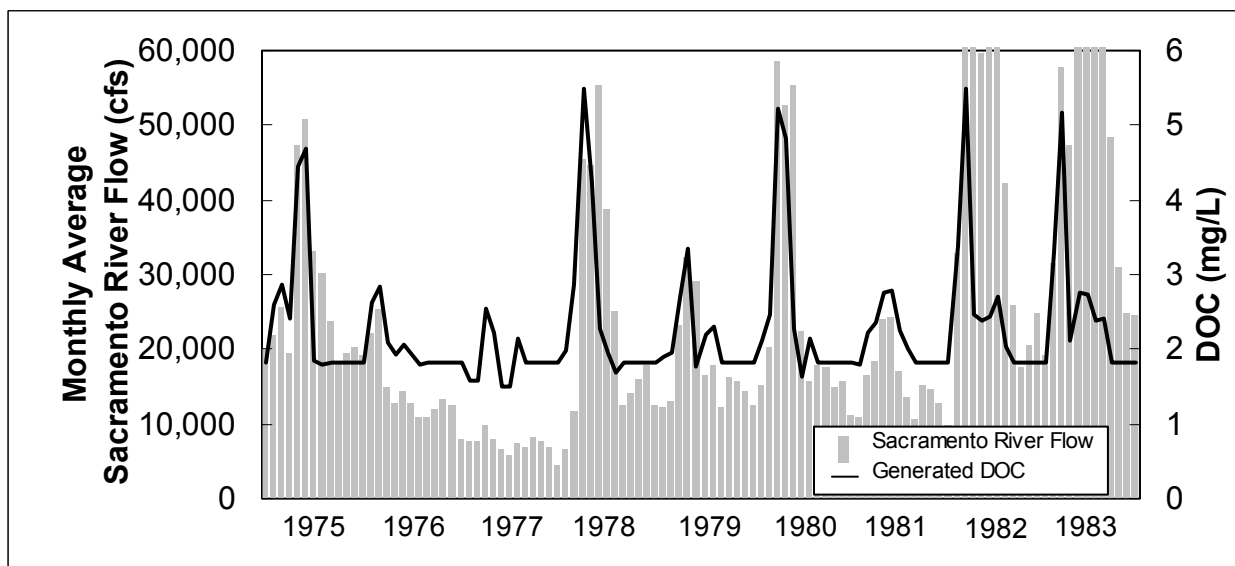


Figure 7.7a: Generated DOC at Greens Landing over the Planning Period: 1975–1983.

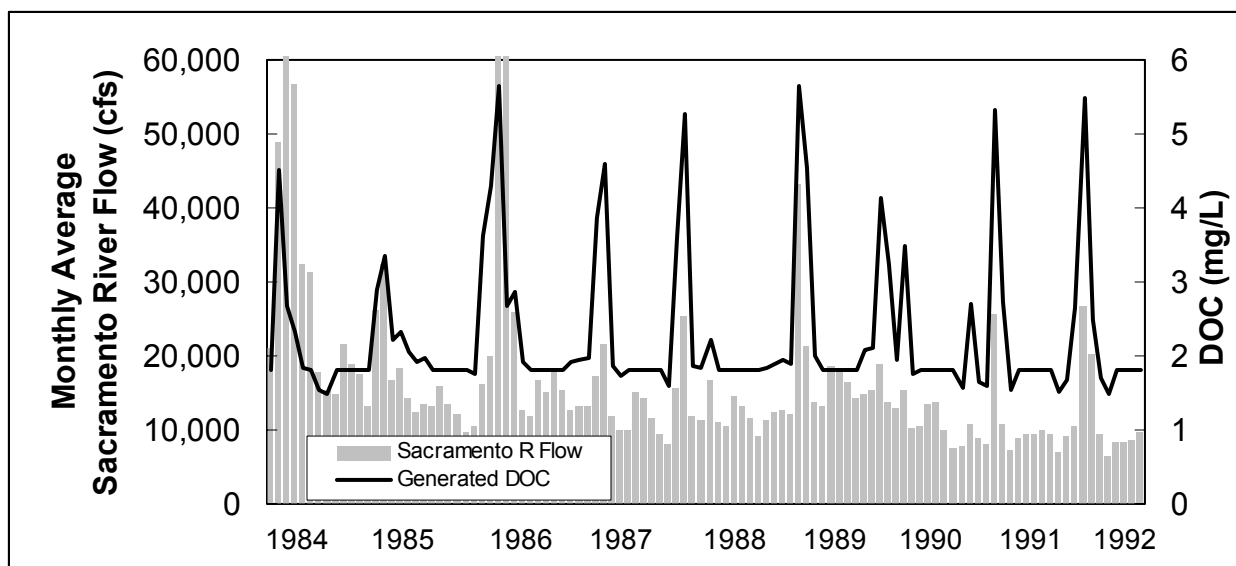


Figure 7.7b: Generated DOC at Greens Landing over the Planning Period: 1984–1992.

Table 7.2: Generated Monthly DOC at Greens Landing (values in mg/L).

Water Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1975	1.81	2.60	2.86	2.41	4.43	4.68	1.84	1.78	1.81	1.81	1.81	1.81
1976	1.81	2.61	2.85	2.10	1.93	2.06	1.93	1.80	1.81	1.81	1.81	1.81
1977	1.81	1.58	1.57	2.53	2.22	1.50	1.50	2.15	1.81	1.81	1.81	1.81
1978	1.81	1.99	2.87	5.50	4.23	2.29	1.96	1.68	1.81	1.81	1.81	1.81
1979	1.81	1.91	1.96	2.68	3.35	1.76	2.20	2.31	1.81	1.81	1.81	1.81
1980	1.81	2.11	2.47	5.23	4.82	2.28	1.63	2.16	1.81	1.81	1.81	1.81
1981	1.81	1.80	2.21	2.34	2.76	2.78	2.25	2.00	1.81	1.81	1.81	1.81
1982	1.81	3.38	5.50	2.47	2.37	2.43	2.71	2.03	1.81	1.81	1.81	1.81
1983	1.81	3.28	5.17	2.13	2.76	2.74	2.39	2.42	1.81	1.81	1.81	1.81
1984	1.81	4.53	2.69	2.31	1.83	1.81	1.54	1.50	1.81	1.81	1.81	1.81
1985	1.81	2.90	3.36	2.22	2.33	2.04	1.91	1.98	1.81	1.81	1.81	1.81
1986	1.81	1.76	3.64	4.31	5.65	2.68	2.87	1.93	1.81	1.81	1.81	1.81
1987	1.81	1.92	1.96	1.96	3.86	4.59	1.86	1.73	1.81	1.81	1.81	1.81
1988	1.81	1.60	3.57	5.26	1.87	1.83	2.23	1.80	1.81	1.81	1.81	1.81
1989	1.81	1.83	1.90	1.94	1.88	5.65	4.54	2.01	1.81	1.81	1.81	1.81
1990	1.81	2.08	2.12	4.13	3.23	1.94	3.49	1.76	1.81	1.81	1.81	1.81
1991	1.81	1.57	2.71	1.66	1.60	5.32	2.72	1.54	1.81	1.81	1.81	1.81
Avg	1.81	2.32	2.91	3.01	3.01	2.85	2.33	1.92	1.81	1.81	1.81	1.81

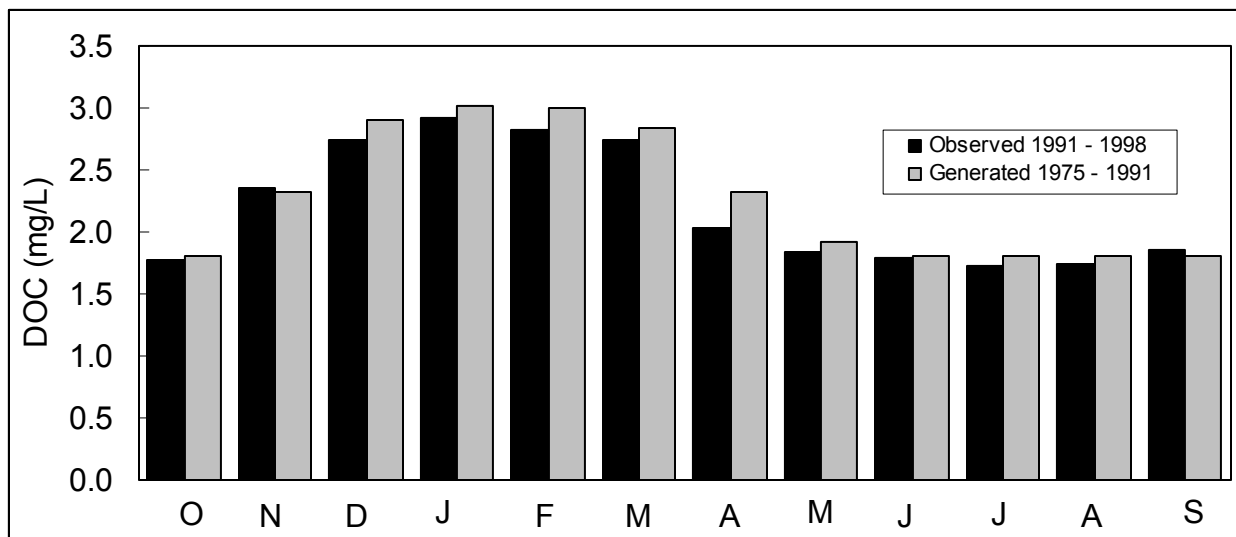


Figure 7.8: Monthly Average Observed and Generated DOC at Greens Landing.

7.3.2 Ultraviolet Absorbance at Greens Landing

UVA at Greens Landing was generated by applying a regression based on observed DOC and UVA at Greens Landing (Figure 7.9) to the generated DOC (Table 7.3).

$$\begin{aligned} \text{UVA} &= 0.039\text{DOC} - 0.03 \\ R^2 &= 0.8 \end{aligned} \quad [\text{Eqn. 7-1}]$$

Where UVA is in units of 1/cm and DOC is in mg/L.

Average generated UVA at Greens Landing over the planning period was consistent with the average observed UVA at Greens Landing (Figure 7.10).

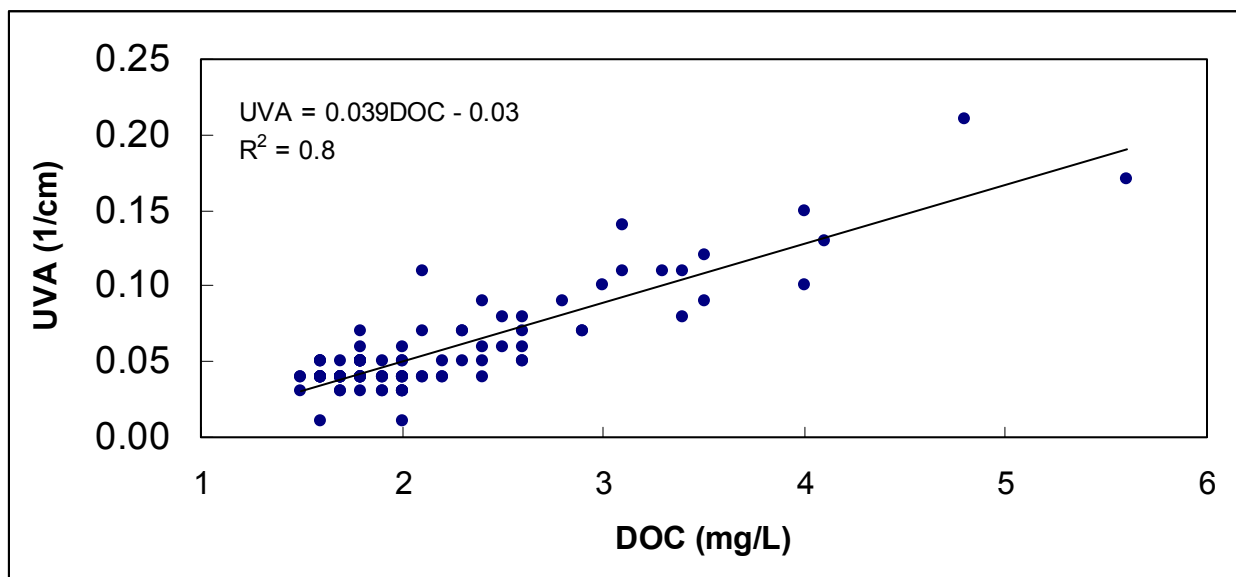


Figure 7.9: Observed UVA versus Observed DOC at Greens Landing.

Table 7.3: Generated Monthly UVA at Greens Landing (values in 1/cm).

Water Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1975	0.04	0.07	0.08	0.07	0.14	0.15	0.04	0.04	0.04	0.04	0.04	0.04
1976	0.04	0.07	0.08	0.05	0.05	0.05	0.05	0.04	0.04	0.04	0.04	0.04
1977	0.04	0.03	0.03	0.07	0.06	0.03	0.03	0.06	0.04	0.04	0.04	0.04
1978	0.04	0.05	0.08	0.19	0.14	0.06	0.05	0.04	0.04	0.04	0.04	0.04
1979	0.04	0.05	0.05	0.08	0.10	0.04	0.06	0.06	0.04	0.04	0.04	0.04
1980	0.04	0.05	0.07	0.18	0.16	0.06	0.04	0.06	0.04	0.04	0.04	0.04
1981	0.04	0.04	0.06	0.06	0.08	0.08	0.06	0.05	0.04	0.04	0.04	0.04
1982	0.04	0.10	0.19	0.07	0.06	0.07	0.08	0.05	0.04	0.04	0.04	0.04
1983	0.04	0.10	0.17	0.05	0.08	0.08	0.06	0.07	0.04	0.04	0.04	0.04
1984	0.04	0.15	0.08	0.06	0.04	0.04	0.03	0.03	0.04	0.04	0.04	0.04
1985	0.04	0.08	0.10	0.06	0.06	0.05	0.05	0.05	0.04	0.04	0.04	0.04
1986	0.04	0.04	0.11	0.14	0.19	0.08	0.08	0.05	0.04	0.04	0.04	0.04
1987	0.04	0.05	0.05	0.05	0.12	0.15	0.04	0.04	0.04	0.04	0.04	0.04
1988	0.04	0.03	0.11	0.18	0.04	0.04	0.06	0.04	0.04	0.04	0.04	0.04
1989	0.04	0.04	0.05	0.05	0.04	0.19	0.15	0.05	0.04	0.04	0.04	0.04
1990	0.04	0.05	0.05	0.13	0.10	0.05	0.11	0.04	0.04	0.04	0.04	0.04
1991	0.04	0.03	0.08	0.04	0.03	0.18	0.08	0.03	0.04	0.04	0.04	0.04
Avg	0.04	0.06	0.08	0.09	0.09	0.08	0.06	0.05	0.04	0.04	0.04	0.04

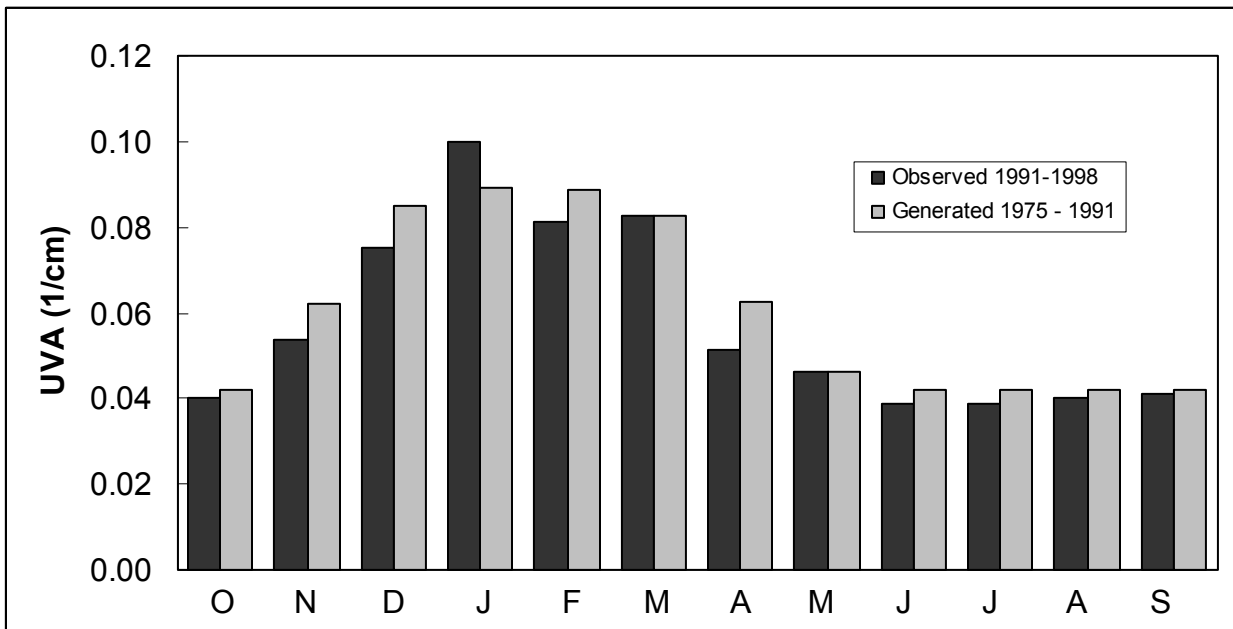


Figure 7.10: Monthly Average Observed and Generated UVA at Greens Landing.

7.4 San Joaquin River at Vernalis

7.4.1 Dissolved Organic Carbon at Vernalis

The method of generating DOC and UVA at Vernalis was similar to that described for Greens Landing. Figure 7.11 shows historic DOC and flow in the San Joaquin River at Vernalis. DOC

from Mossdale was used if available during times when Vernalis data was missing. Average observed DOC from June through October, 3.83 mg/L, approximated the monthly DOC over this interval for the planning period (Figure 7.12). DOC from other months again exhibited a pattern of high values associated with the first large flows of the fall/winter and low values after sustained high flows. The Vernalis/Mossdale DOC was partitioned according to DOC / flow values into four classifications, labeled “low”, “moderate-low”, “moderate-high”, or “high” DOC response to flow. Figure 7.13 and Table 7.4 show that, after excluding the June-October data, reasonable regressions could be found between DOC and flow.

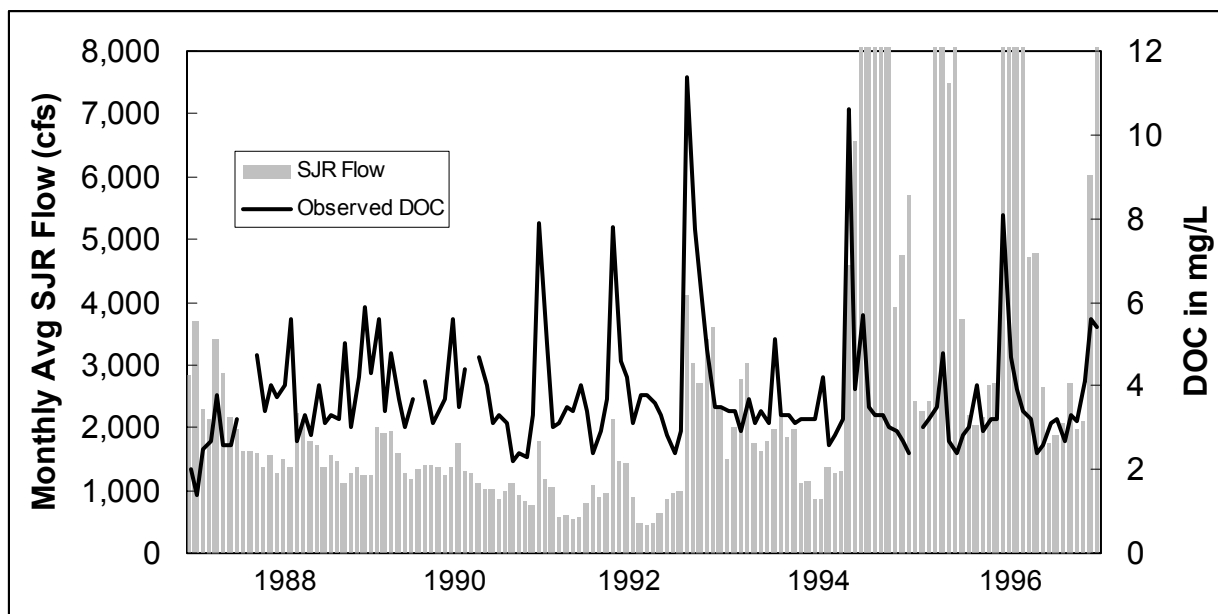


Figure 7.11: Observed DOC and Flow at Vernalis.

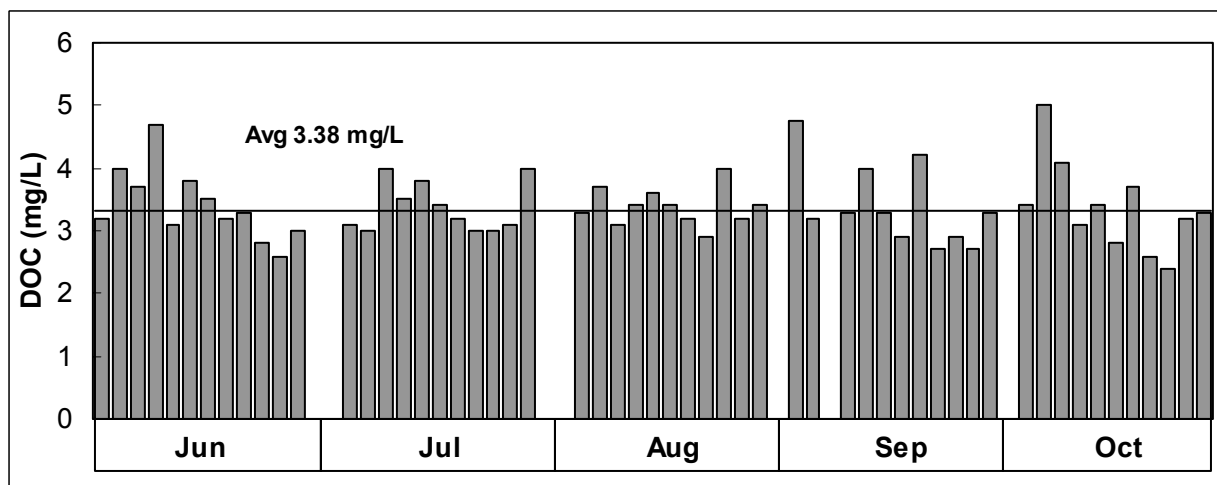


Figure 7.12: Observed DOC at Vernalis, 1987–1997 (Grouped by Month).

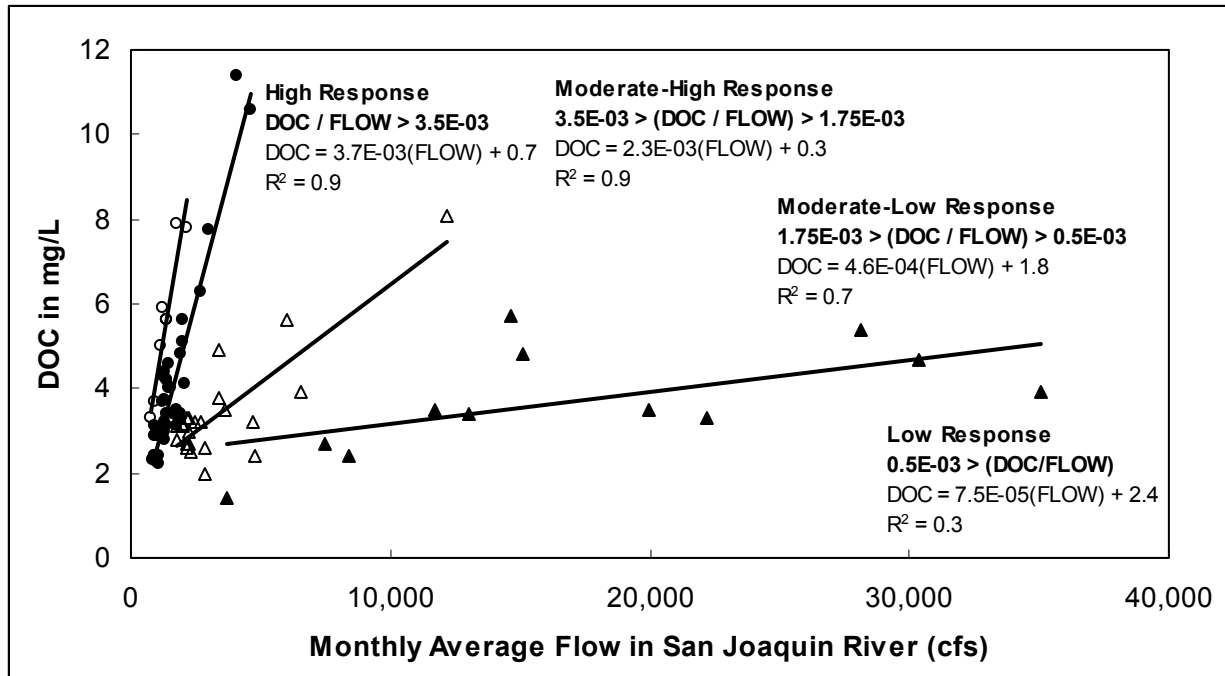


Figure 7.13: Observed DOC and Flow at Vernalis (Jun.–Oct. Data Removed).

Table 7.4: Classification of DOC Responses to Flow at Vernalis.

DOC Response to Flow	Criteria	Regression Equation	R ²
Low	$0.5\text{E-}03 > \text{DOC} / \text{FLOW}$	$\text{DOC} = 7.5\text{E-}05(\text{FLOW}) + 2.4$	0.3
Moderate-Low	$1.75\text{E-}03 > \text{DOC} / \text{FLOW} > 0.5\text{E-}03$	$\text{DOC} = 4.6\text{E-}04(\text{FLOW}) + 1.8$	0.7
Moderate-High	$20\text{E-}03 > \text{DOC} / \text{FLOW} > 1.75\text{E-}03$	$\text{DOC} = 2.3\text{E-}03(\text{FLOW}) + 0.3$	0.9
High	$\text{DOC} / \text{FLOW} > 20 \text{E-}03$	$\text{DOC} = 3.7\text{E-}03(\text{FLOW}) + 0.7$	0.9
DOC: monthly dissolved organic carbon			
FLOW: monthly average flow in San Joaquin River at Vernalis (cfs)			

Historic DOC was then associated with "low," "moderate-low," "moderate-high", or "high" response to flow (Figure 7.14). The "high" DOC response to flow tended to be associated with the first significant flow after many months of low flow. Categories of DOC response to flow displayed in Figure 7.14 were assigned to the planning period by considering similar patterns in flow. This allowed each monthly flow during the planning period to be associated with either 3.83 mg/L DOC (June–October), or with one of four regressions with DOC (Figure 7.15).

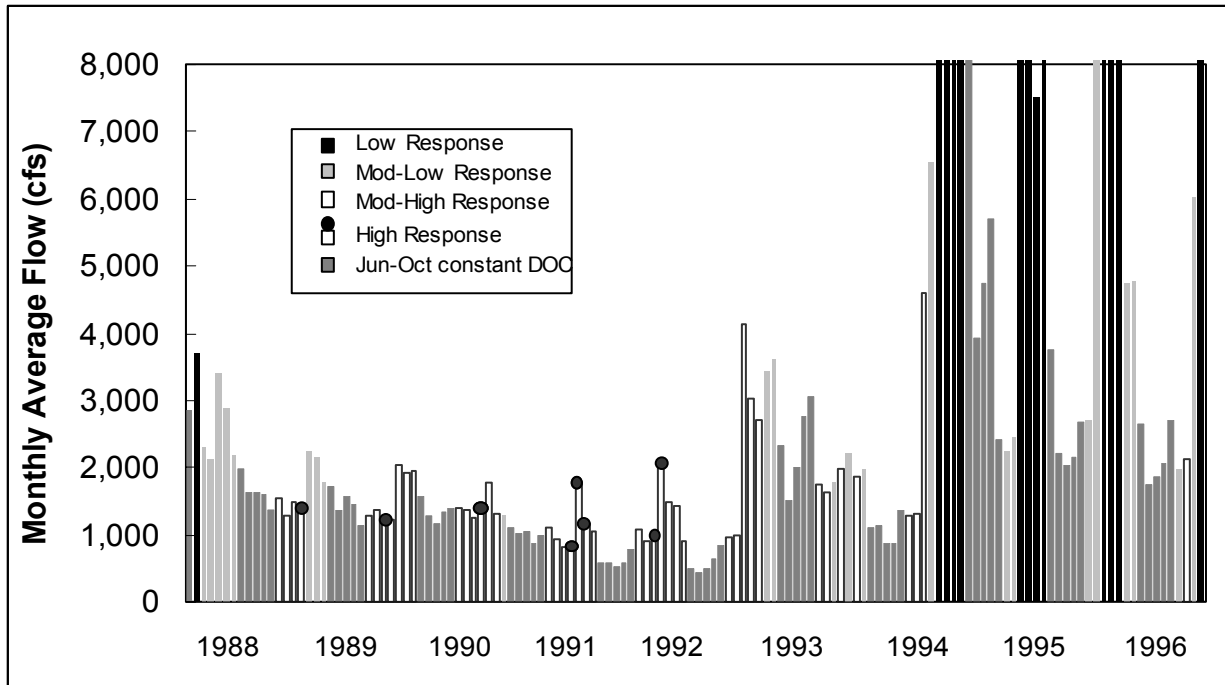


Figure 7.14: Historic SJR Flow at Vernalis Categorized by DOC Response to Flow.

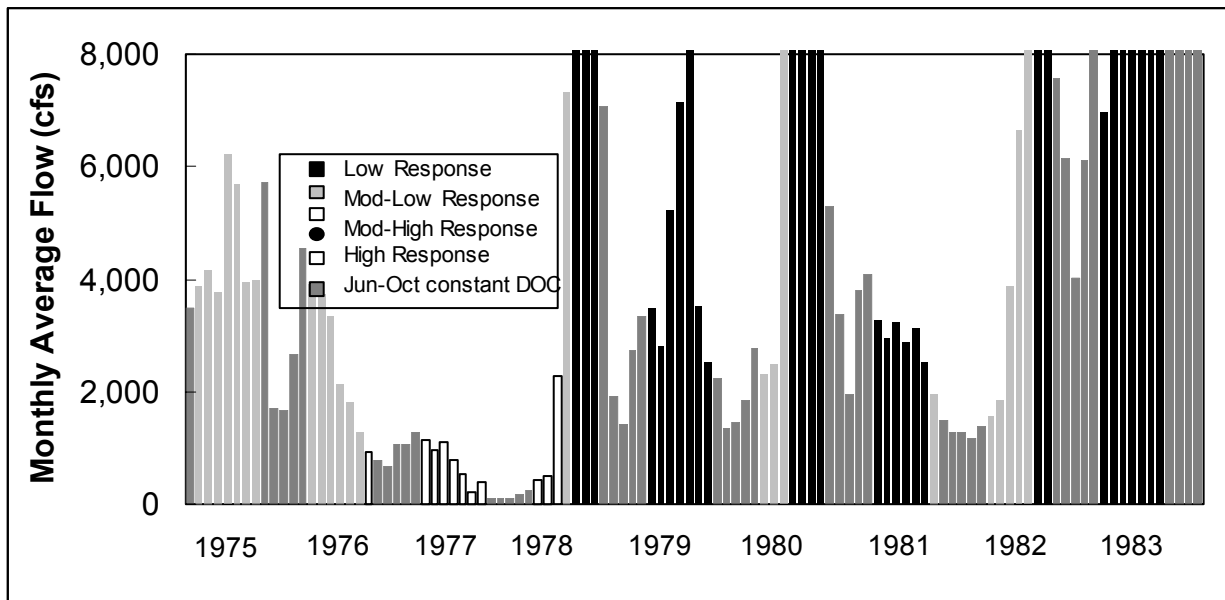


Figure 7.15a: Assignment of DOC/Flow Relationship at Vernalis for Planning Period: 1975–1983.

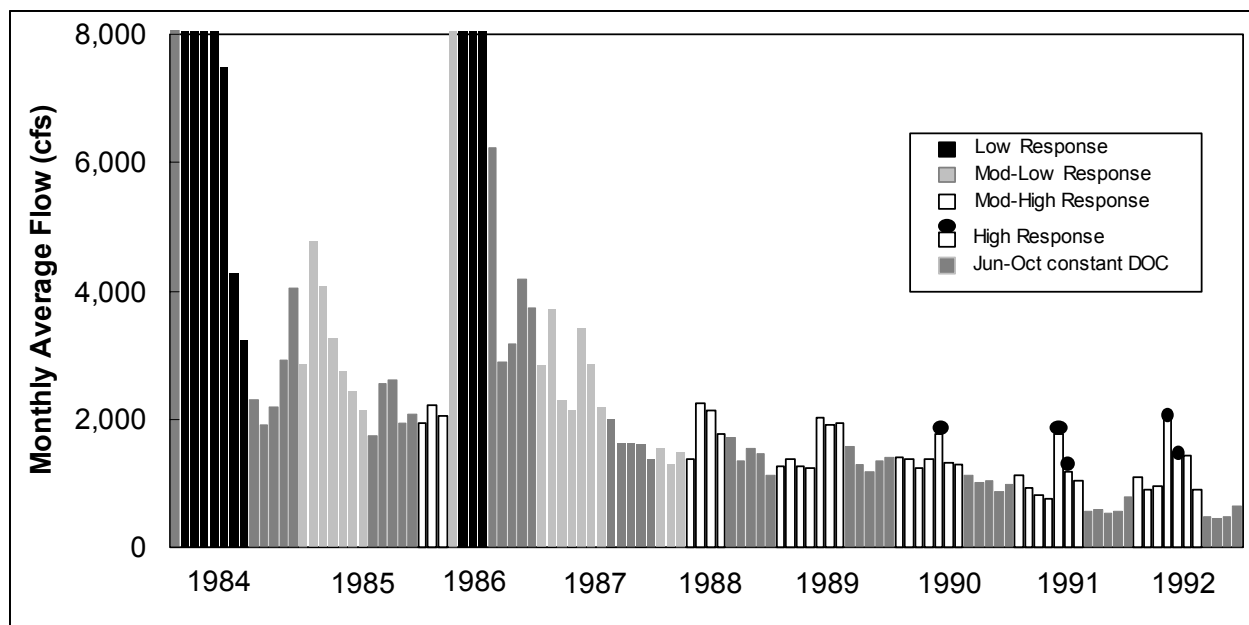


Figure 7.15b: Assignment of DOC/Flow Relationship at Vernalis for Planning Period: 1984–1992.

After assigning a DOC of 3.83 mg/L to each month from June through October, regressions were applied to average flows from other months to generate DOC. DOC derived from the regressions was limited to between 2.4 and 11.4 mg/L, the minimum and maximum values seen in the observed data. Figure 7.16 compares the historic Vernalis/Mossdale DOC to the DOC generated by this method. Figure 7.17 and Table 7.5 show the resulting generated DOC over the planning period. The average DOC generated at Vernalis by this process over the planning period was similar to the average observed DOC (Figure 7.18).

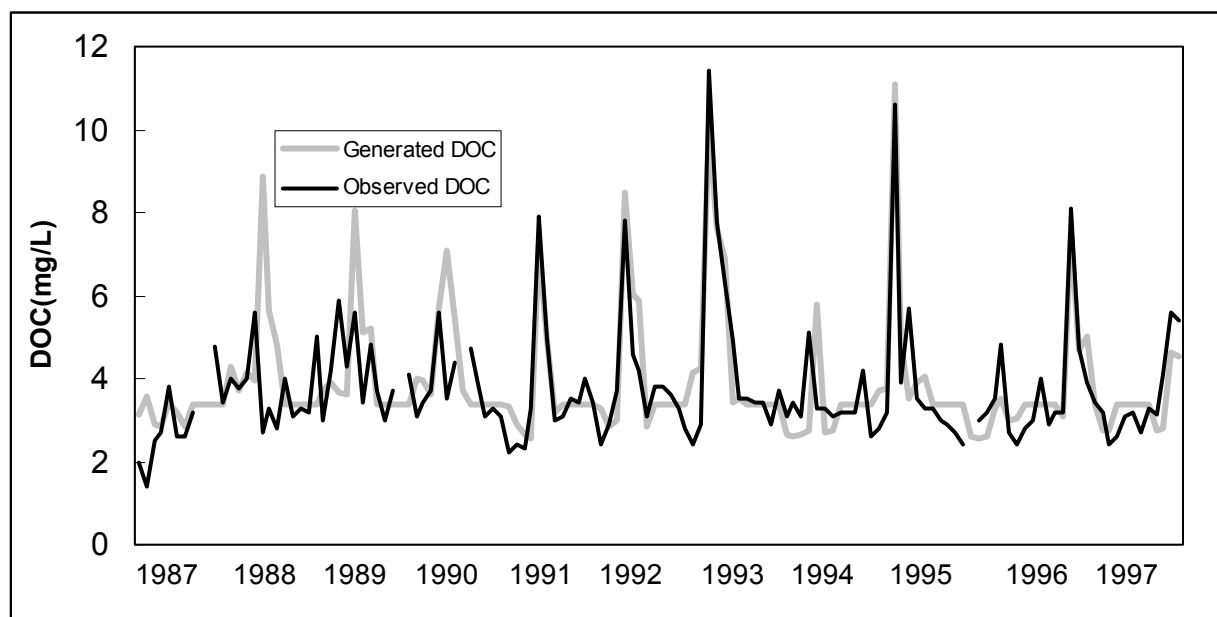


Figure 7.16: Observed and Generated DOC at Vernalis.

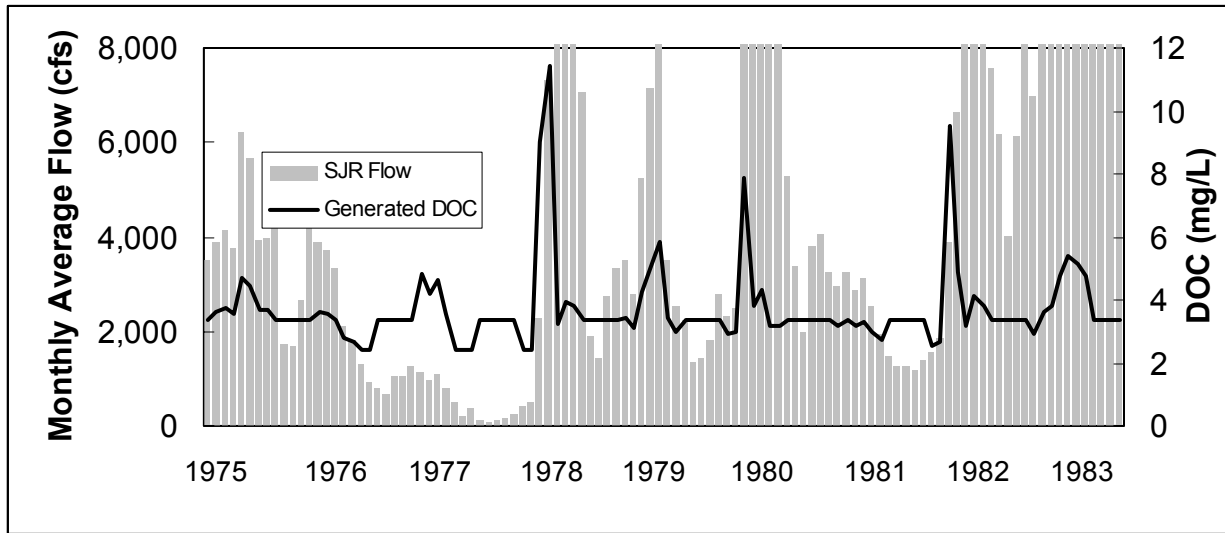


Figure 7.17a: Generated DOC at Vernalis over the Planning Period: 1975–1983.

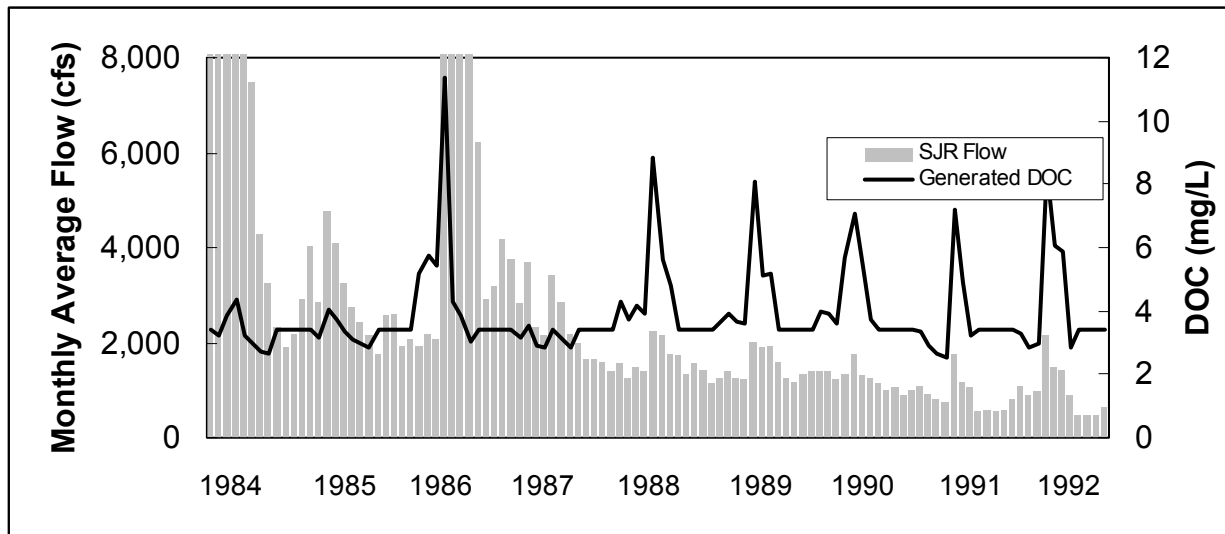


Figure 7.17b: Generated DOC at Vernalis over the Planning Period: 1984–1992.

Table 7.5: Generated DOC at Vernalis (values in mg/L).

Water Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1975	3.38	3.64	3.76	3.58	4.71	4.47	3.67	3.68	3.38	3.38	3.38	3.38
1976	3.38	3.65	3.57	3.38	2.82	2.68	2.44	2.40	3.38	3.38	3.38	3.38
1977	3.38	4.83	4.20	4.66	3.56	2.40	2.40	2.40	3.38	3.38	3.38	3.38
1978	3.38	2.40	2.40	8.99	11.40	3.27	3.91	3.84	3.38	3.38	3.38	3.38
1979	3.38	3.46	3.14	4.26	5.14	5.84	3.46	3.01	3.38	3.38	3.38	3.38
1980	3.38	2.91	2.99	7.89	3.80	4.30	3.17	3.15	3.38	3.38	3.38	3.38
1981	3.38	3.35	3.20	3.34	3.17	3.28	3.01	2.75	3.38	3.38	3.38	3.38
1982	3.38	2.56	2.69	9.51	4.91	3.16	4.13	3.80	3.38	3.38	3.38	3.38
1983	3.38	2.93	3.64	3.84	4.78	5.41	5.14	4.79	3.38	3.38	3.38	3.38
1984	3.38	3.22	3.84	4.34	3.21	2.97	2.73	2.65	3.38	3.38	3.38	3.38
1985	3.38	3.16	4.05	3.72	3.34	3.11	2.97	2.82	3.38	3.38	3.38	3.38
1986	3.38	5.15	5.76	5.44	11.40	4.28	3.87	3.06	3.38	3.38	3.38	3.38
1987	3.38	3.15	3.55	2.90	2.83	3.42	3.16	2.85	3.38	3.38	3.38	3.38
1988	3.38	4.30	3.70	4.16	3.93	8.86	5.63	4.82	3.38	3.38	3.38	3.38
1989	3.38	3.69	3.91	3.65	3.60	8.06	5.12	5.19	3.38	3.38	3.38	3.38
1990	3.38	3.98	3.93	3.62	5.66	7.10	5.46	3.70	3.38	3.38	3.38	3.38
1991	3.38	3.34	2.90	2.67	2.54	7.17	4.94	3.19	3.38	3.38	3.38	3.38
Avg	3.38	3.51	3.60	4.70	4.75	4.69	3.84	3.42	3.38	3.38	3.38	3.38

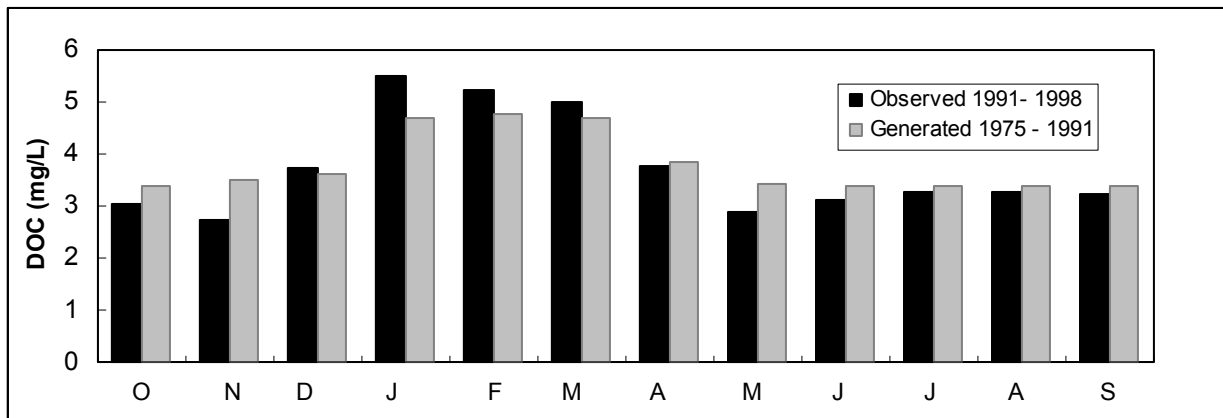


Figure 7.18: Monthly Average Observed and Generated DOC at Vernalis.

7.4.2 Ultraviolet Absorbance at Vernalis

UVA at Vernalis was generated by applying a regression based on observed DOC and UVA at Vernalis (Figure 7.19) to the generated DOC (Table 7.6):

$$\text{UVA} = 0.037\text{DOC} - 0.035 \quad [\text{Eqn. 7-2}]$$

$$R^2 = 0.9$$

Average generated UVA at Vernalis over the planning period was consistent with the average observed UVA at Vernalis (Figure 7.20).

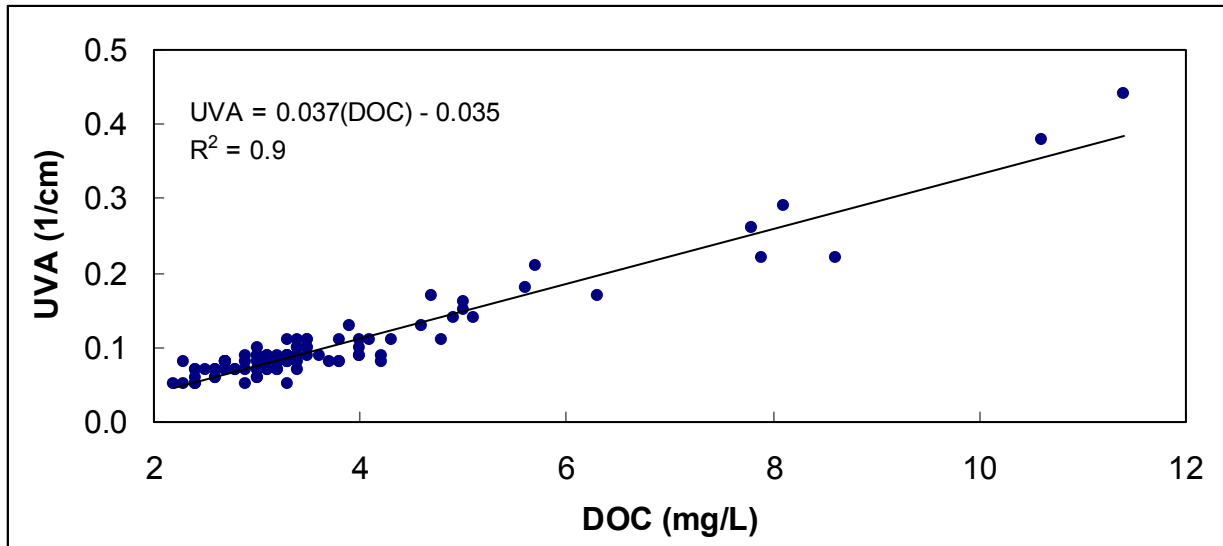


Figure 7.19: Observed UVA versus Observed DOC at Vernalis/Mossdale.

Table 7.6: Generated UVA at Vernalis (values in 1/cm).

Water Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1975	0.09	0.10	0.10	0.10	0.14	0.13	0.10	0.10	0.09	0.09	0.09	0.09
1976	0.09	0.10	0.10	0.09	0.07	0.06	0.06	0.05	0.09	0.09	0.09	0.09
1977	0.09	0.14	0.12	0.14	0.10	0.05	0.05	0.05	0.09	0.09	0.09	0.09
1978	0.09	0.05	0.05	0.30	0.39	0.09	0.11	0.11	0.09	0.09	0.09	0.09
1979	0.09	0.09	0.08	0.12	0.16	0.18	0.09	0.08	0.09	0.09	0.09	0.09
1980	0.09	0.07	0.08	0.26	0.11	0.12	0.08	0.08	0.09	0.09	0.09	0.09
1981	0.09	0.09	0.08	0.09	0.08	0.09	0.08	0.07	0.09	0.09	0.09	0.09
1982	0.09	0.06	0.06	0.32	0.15	0.08	0.12	0.11	0.09	0.09	0.09	0.09
1983	0.09	0.07	0.10	0.11	0.14	0.16	0.15	0.14	0.09	0.09	0.09	0.09
1984	0.09	0.08	0.11	0.13	0.08	0.07	0.07	0.06	0.09	0.09	0.09	0.09
1985	0.09	0.08	0.11	0.10	0.09	0.08	0.07	0.07	0.09	0.09	0.09	0.09
1986	0.09	0.16	0.18	0.17	0.39	0.12	0.11	0.08	0.09	0.09	0.09	0.09
1987	0.09	0.08	0.10	0.07	0.07	0.09	0.08	0.07	0.09	0.09	0.09	0.09
1988	0.09	0.12	0.10	0.12	0.11	0.29	0.17	0.14	0.09	0.09	0.09	0.09
1989	0.09	0.10	0.11	0.10	0.10	0.26	0.15	0.16	0.09	0.09	0.09	0.09
1990	0.09	0.11	0.11	0.10	0.17	0.23	0.17	0.10	0.09	0.09	0.09	0.09
1991	0.09	0.09	0.07	0.06	0.06	0.23	0.15	0.08	0.09	0.09	0.09	0.09
Avg	0.09	0.09	0.10	0.14	0.14	0.14	0.11	0.09	0.09	0.09	0.09	0.09

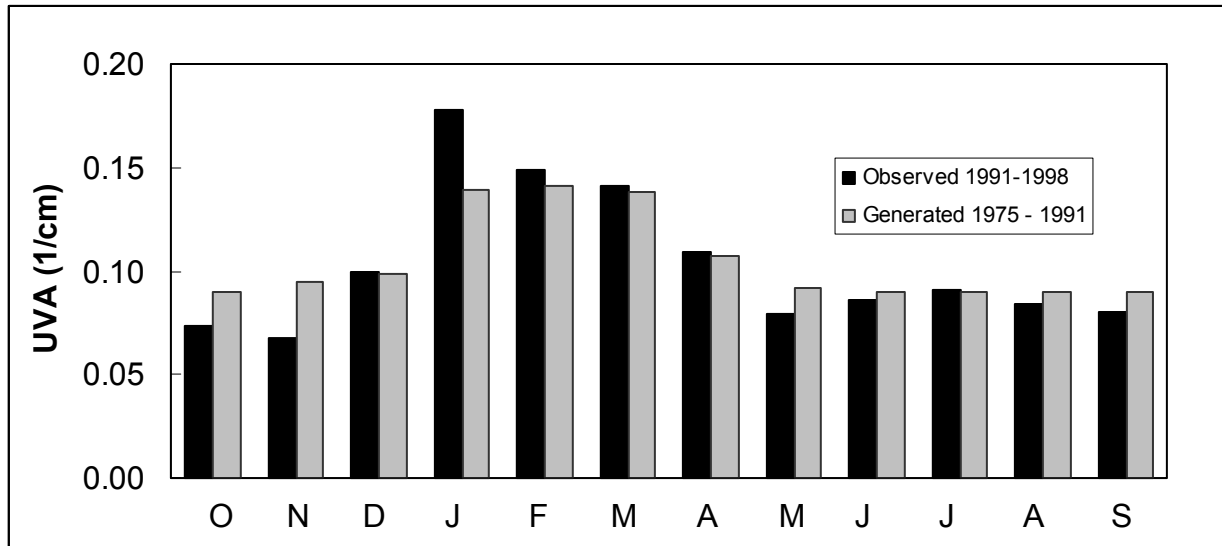


Figure 7.20: Monthly Average Observed and Generated UVA at Vernalis.

7.5 Mokelumne River

7.5.1 Dissolved Organic Carbon

Due to insufficient data, observed DOC from the American River was used to generate DOC for the Mokelumne River. Figure 7.21 shows historic DOC and flow in the American River. DOC from June through October was averaged to yield a single value of 1.66 mg/L to approximate monthly DOC each year during this interval for the planning period (Figure 7.22). Unlike Greens Landing and Vernalis, DOC in the American River in other months exhibited no apparent pattern with flows and therefore was simply averaged to yield two alternative values of DOC (Figure 7.23):

Low DOC = 1.74 mg/L
 High DOC = 3.95 mg/L

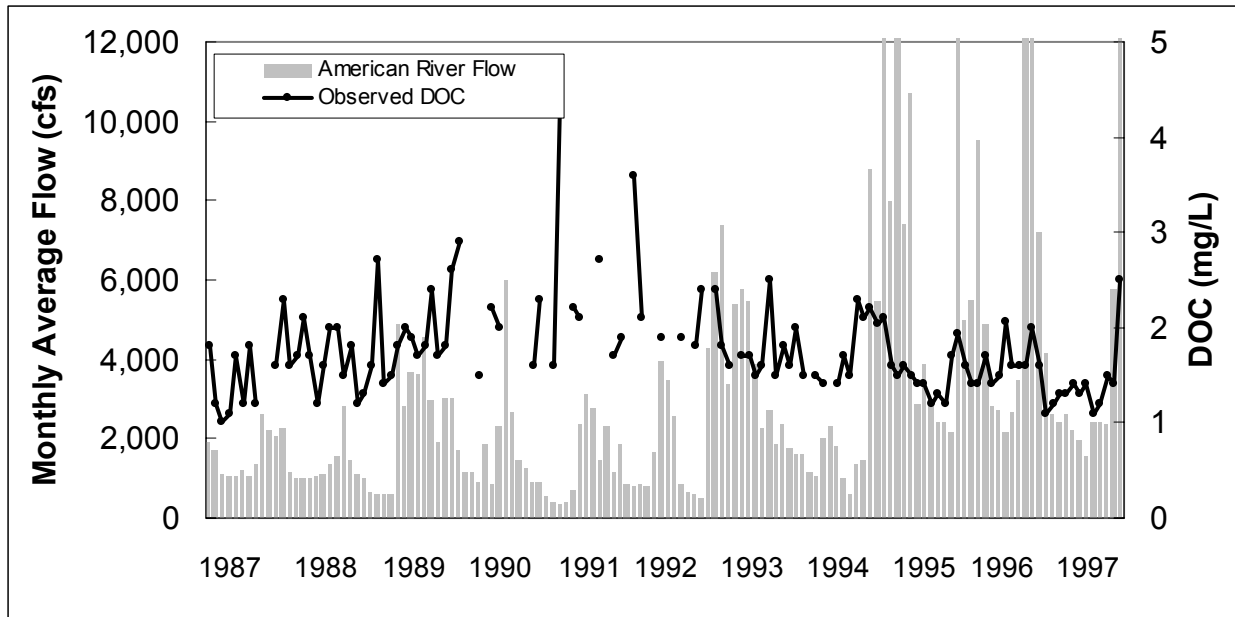


Figure 7.21: Observed DOC and Flow in the American River.

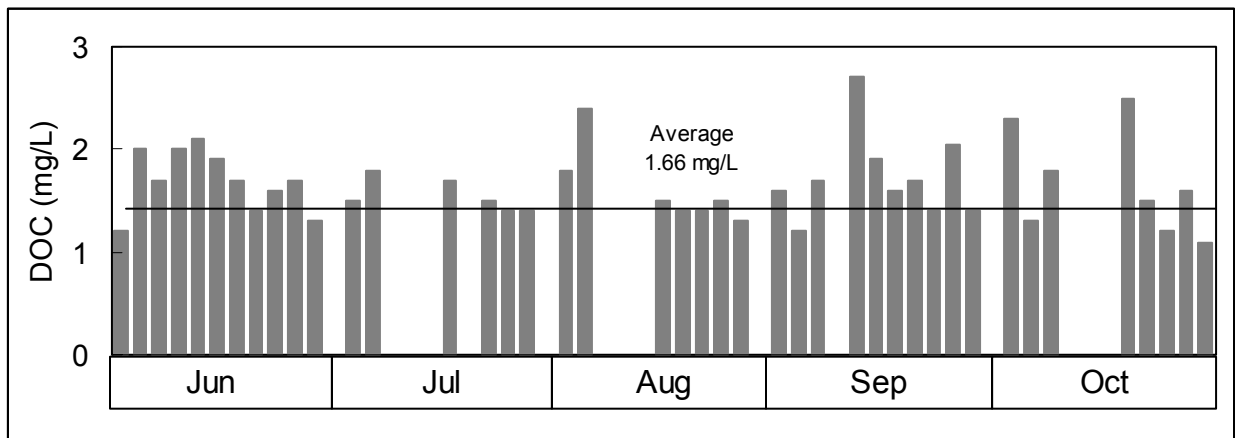


Figure 7.22: Observed DOC in the American River, 1987-1997 (Grouped by Month).

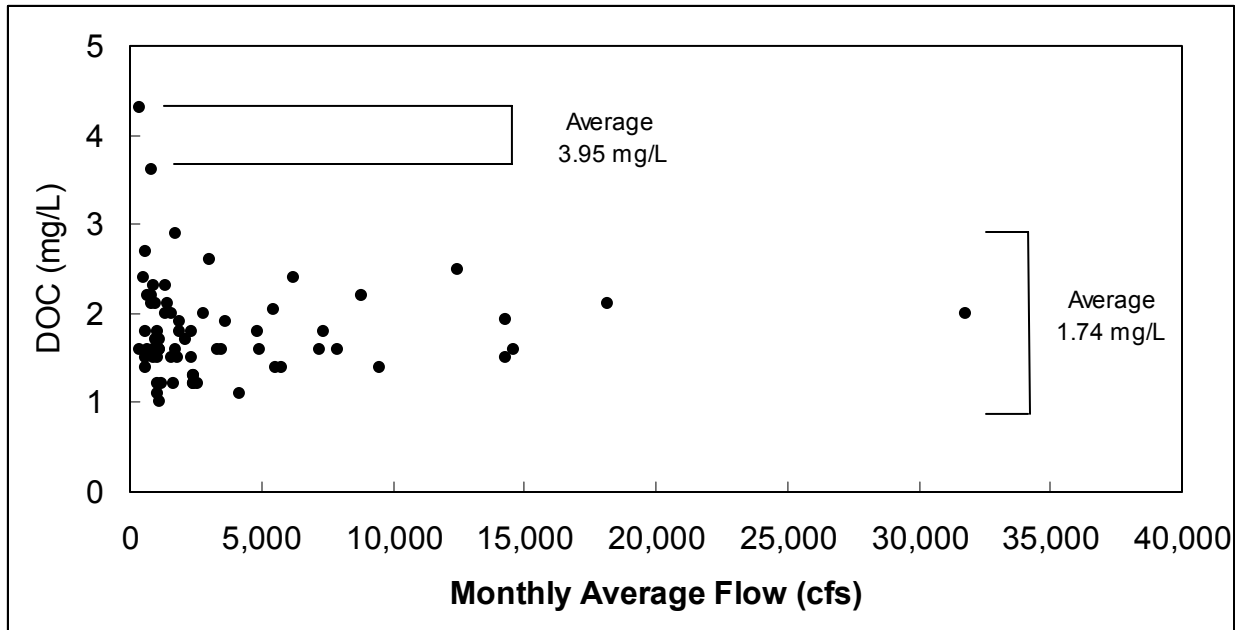


Figure 7.23: Flow and Observed DOC in the American River (Jun.–Oct. Data Removed).

These DOC values were then associated with flow in the Mokelumne River over the planning period, with 3.95 mg/L assigned to the first higher flows in the winter, 1.66 mg/L to June through October, and 1.74 mg/L to all other months (Figure 7.24, Table 7.7). The average DOC generated in the Mokelumne River by this process over the planning period was similar to the average observed DOC (Figure 7.25).

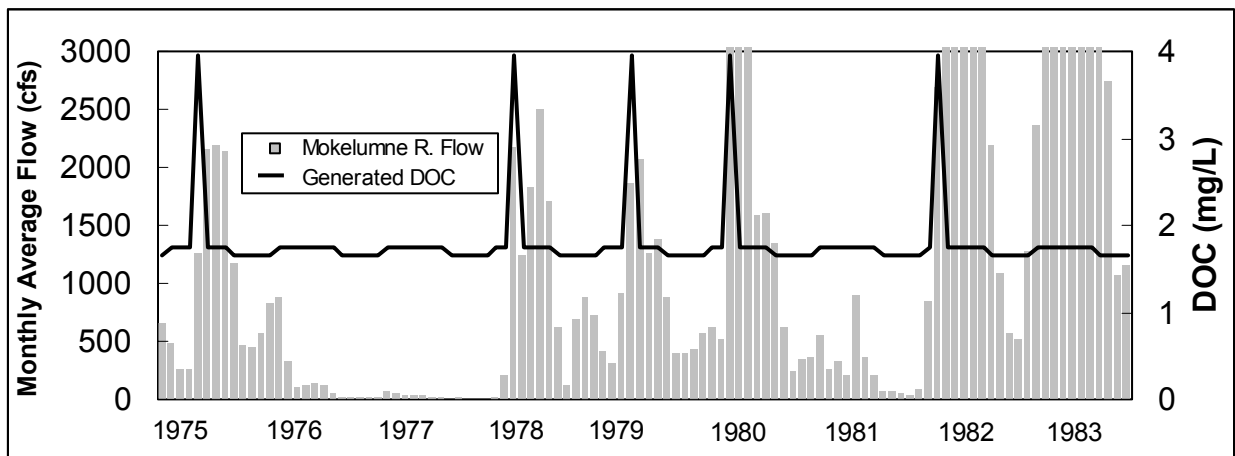


Figure 7.24a: Generated DOC in the Mokelumne River over the Planning Period: 1975–1983.

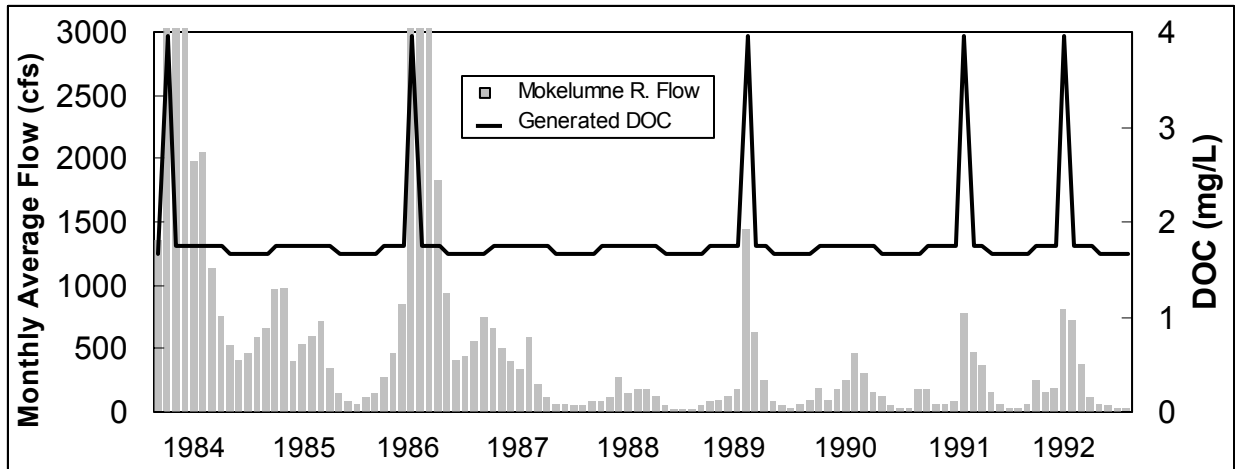


Figure 7.24b: Generated DOC in the Mokelumne River over the Planning Period: 1984–1992.

Table 7.7: Generated DOC in Mokelumne River (values in mg/L).

Water Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1975	1.66	1.74	1.74	1.74	3.95	1.74	1.74	1.74	1.66	1.66	1.66	1.66
1976	1.66	1.74	1.74	1.74	1.74	1.74	1.74	1.74	1.66	1.66	1.66	1.66
1977	1.66	1.74	1.74	1.74	1.74	1.74	1.74	1.74	1.66	1.66	1.66	1.66
1978	1.66	1.74	1.74	3.95	1.74	1.74	1.74	1.74	1.66	1.66	1.66	1.66
1979	1.66	1.74	1.74	1.74	3.95	1.74	1.74	1.74	1.66	1.66	1.66	1.66
1980	1.66	1.74	1.74	3.95	1.74	1.74	1.74	1.74	1.66	1.66	1.66	1.66
1981	1.66	1.74	1.74	1.74	1.74	1.74	1.74	1.74	1.66	1.66	1.66	1.66
1982	1.66	1.74	3.95	1.74	1.74	1.74	1.74	1.74	1.66	1.66	1.66	1.66
1983	1.66	1.74	1.74	1.74	1.74	1.74	1.74	1.74	1.66	1.66	1.66	1.66
1984	1.66	3.95	1.74	1.74	1.74	1.74	1.74	1.74	1.66	1.66	1.66	1.66
1985	1.66	1.74	1.74	1.74	1.74	1.74	1.74	1.74	1.66	1.66	1.66	1.66
1986	1.66	1.74	1.74	1.74	3.95	1.74	1.74	1.74	1.66	1.66	1.66	1.66
1987	1.66	1.74	1.74	1.74	1.74	1.74	1.74	1.74	1.66	1.66	1.66	1.66
1988	1.66	1.74	1.74	1.74	1.74	1.74	1.74	1.74	1.66	1.66	1.66	1.66
1989	1.66	1.74	1.74	1.74	1.74	3.95	1.74	1.74	1.66	1.66	1.66	1.66
1990	1.66	1.74	1.74	1.74	1.74	1.74	1.74	1.74	1.66	1.66	1.66	1.66
1991	1.66	1.74	1.74	1.74	1.74	3.95	1.74	1.74	1.66	1.66	1.66	1.66
Avg	1.66	1.87	1.87	2.00	2.13	2.00	1.74	1.74	1.66	1.66	1.66	1.66

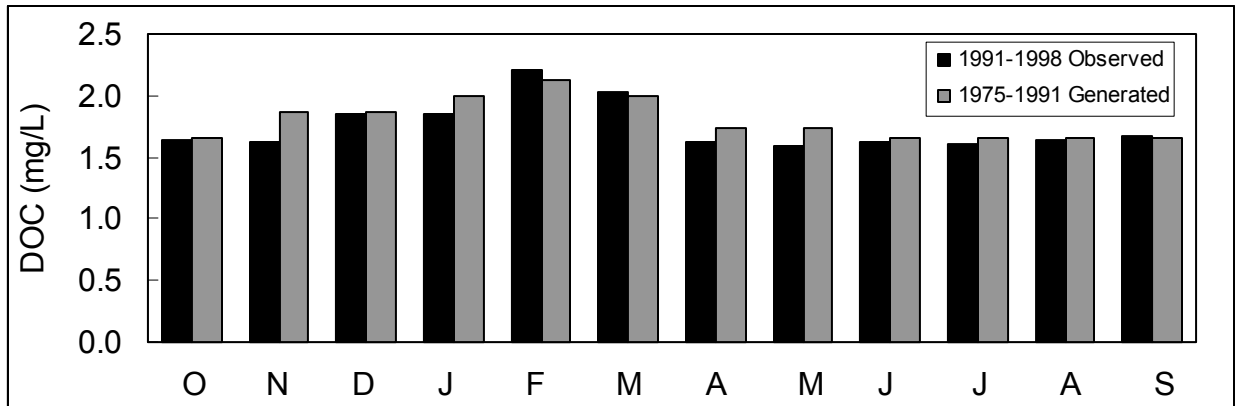


Figure 7.25: Monthly Average Observed and Generated DOC in the Mokelumne River.

7.5.2 Ultraviolet Absorbance

UVA in the Mokelumne River was generated by applying a regression based on historic DOC and UVA to the generated DOC (Figure 7.26, Table 7.8). Average generated UVA in the Mokelumne River over the planning period was consistent with the average observed UVA (Figure 7.27).

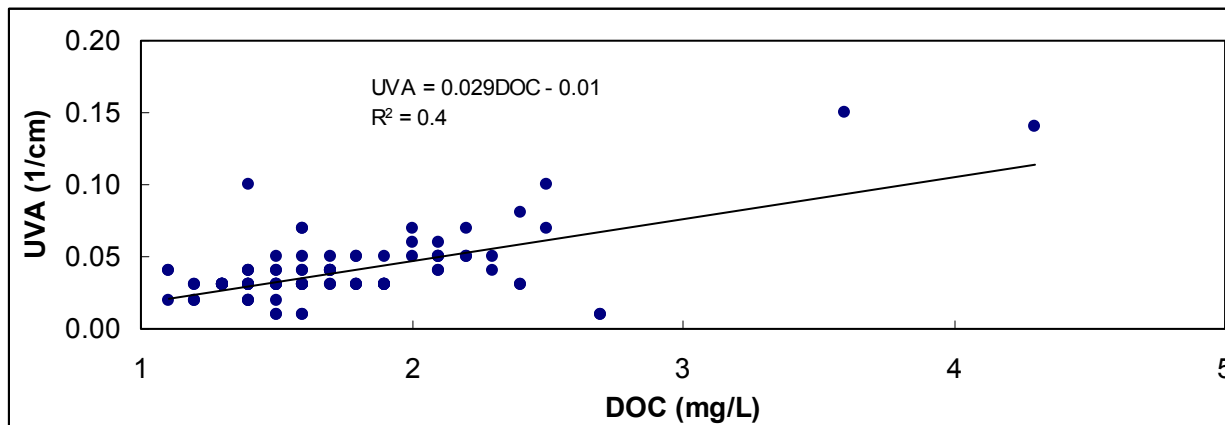


Figure 7.26: Observed UVA versus Observed DOC in the Mokelumne River.

Table 7.8: Generated UVA in Mokelumne River (values in 1/cm).

Water Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1975	0.04	0.04	0.04	0.04	0.10	0.04	0.04	0.04	0.04	0.04	0.04	0.04
1976	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
1977	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
1978	0.04	0.04	0.04	0.10	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
1979	0.04	0.04	0.04	0.04	0.10	0.04	0.04	0.04	0.04	0.04	0.04	0.04
1980	0.04	0.04	0.04	0.10	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
1981	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
1982	0.04	0.04	0.10	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
1983	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
1984	0.04	0.10	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
1985	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
1986	0.04	0.04	0.04	0.04	0.10	0.04	0.04	0.04	0.04	0.04	0.04	0.04
1987	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
1988	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
1989	0.04	0.04	0.04	0.04	0.04	0.10	0.04	0.04	0.04	0.04	0.04	0.04
1990	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
1991	0.04	0.04	0.04	0.04	0.04	0.10	0.04	0.04	0.04	0.04	0.04	0.04
Avg	0.04	0.04	0.04	0.05	0.05	0.05	0.04	0.04	0.04	0.04	0.04	0.04

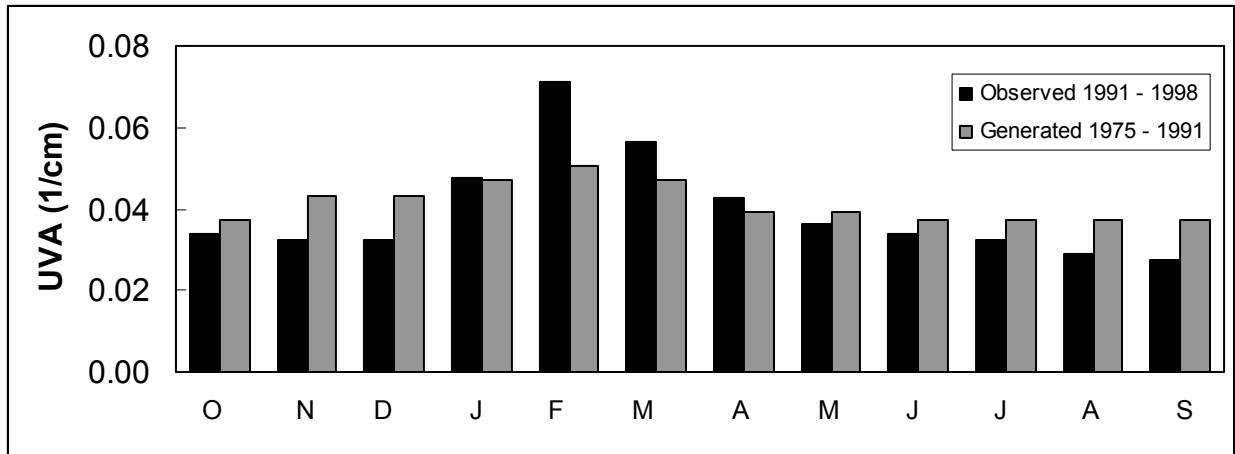


Figure 7.27: Monthly Average Observed and Generated UVA in the Mokelumne River.